

**Base-Flow Characteristics of Streams in the
Valley and Ridge, Blue Ridge, and Piedmont
Physiographic Provinces of Virginia**

WSP 2457

**Low-Flow Characteristics of
Streams in Virginia**

WSP 2374

Purpose

- Describe base-flow characteristics of streams in Virginia
- Identify regional differences
- Describe the potential surface-water and ground-water yields of basins on the basis of base-flow characteristics

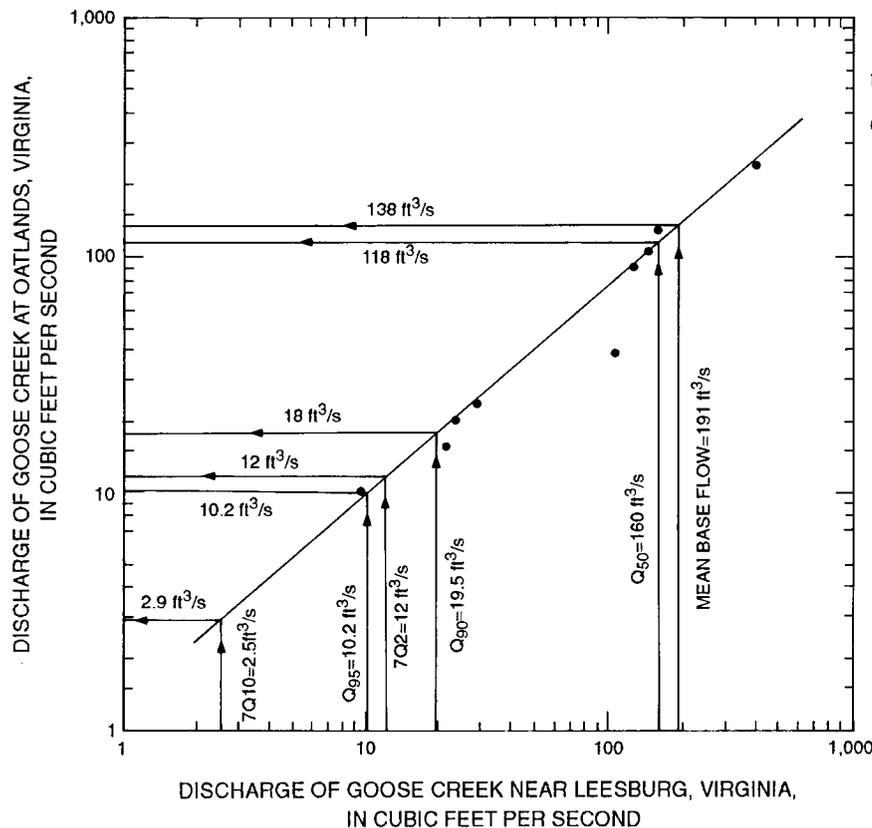
“The distribution of low flows is controlled chiefly by the geology of the basin. Thus, the lower end of the flow-duration curve is a valuable means for studying the effect of geology on the ground-water runoff to the stream.”

WSP 1542-A

Base-Flow Characteristics

- Mean base flow
- Effective recharge
- Q50
- Q90
- Q95
- 7Q2
- 7Q10
- Base-flow variability

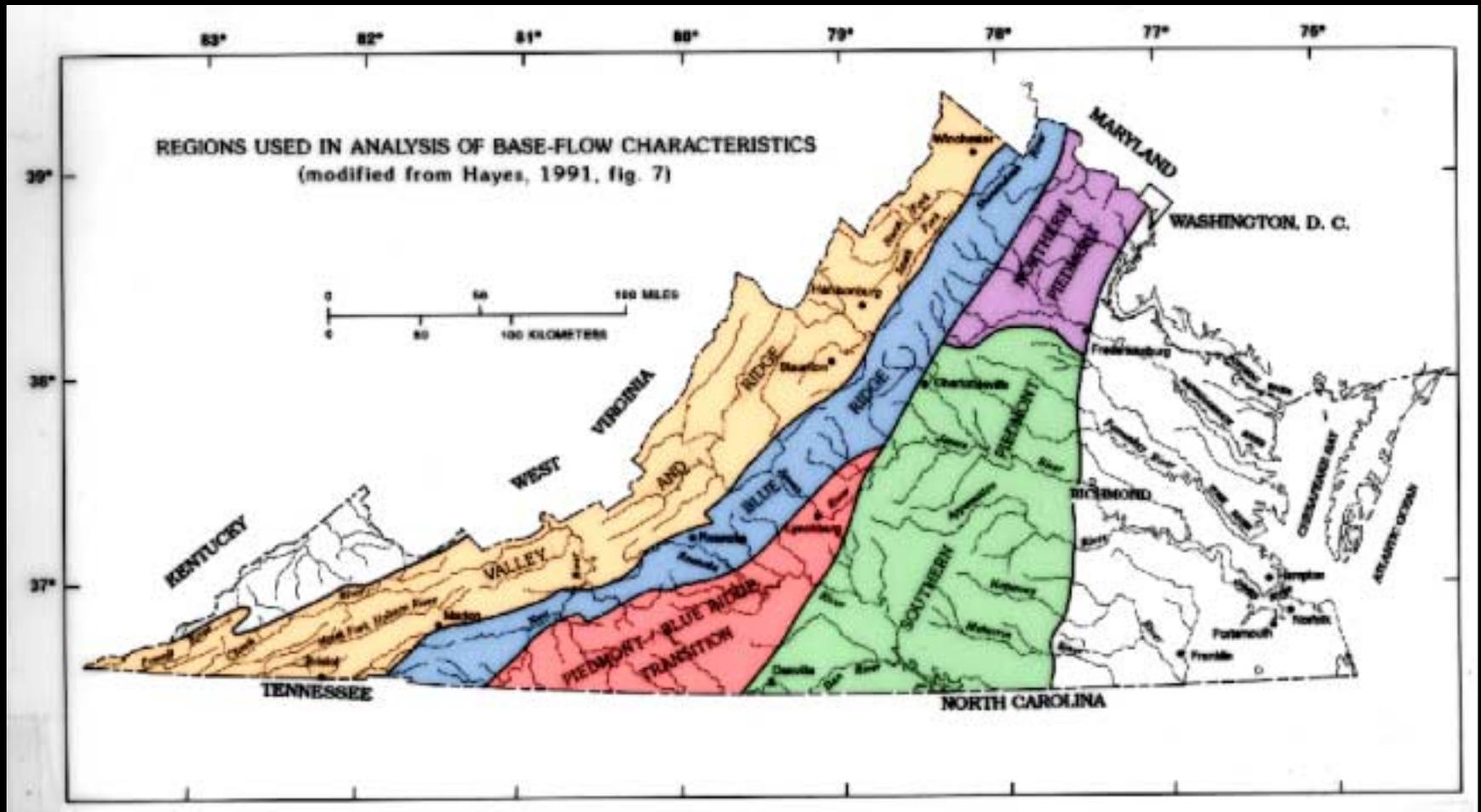
Determination of Base-Flow Characteristics at Partial-Record Sites



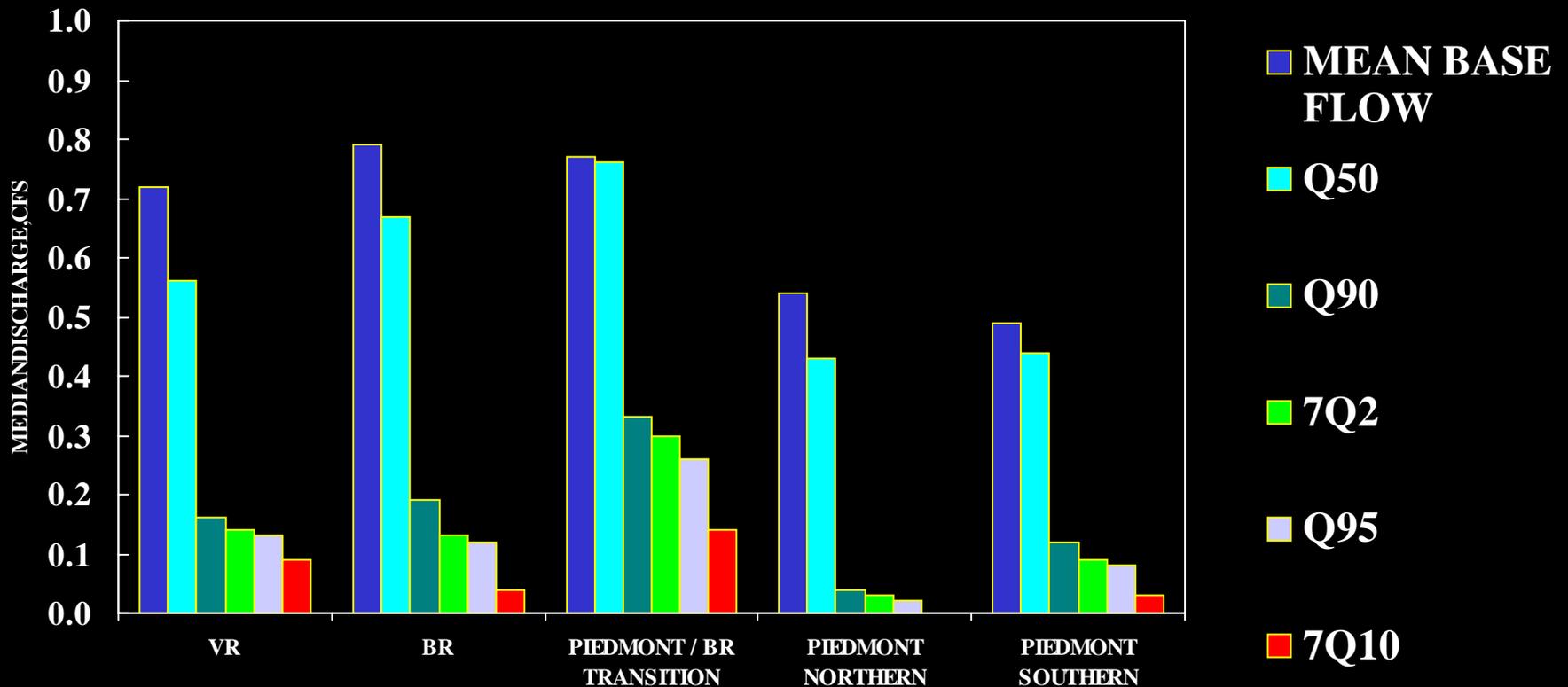
EXPLANATION

- ft³/s Cubic feet per second
- Q₅₀, Q₉₀, Q₉₅ 50-, 90-, and 95- percent discharge on the streamflow-duration curve, respectively
- 7Q2, 7Q10 Annual minimum average 7-consecutive-day low-flow discharge having 2-year and 10-year recurrence intervals, respectively

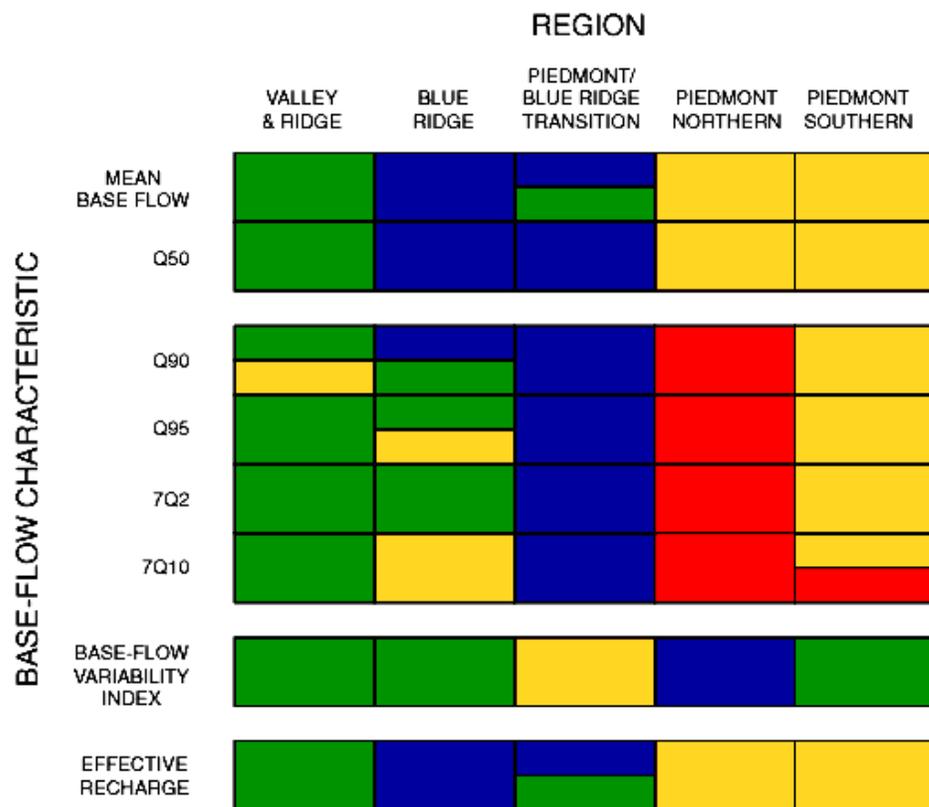
Regions Used in Analysis of Base-Flow Characteristics



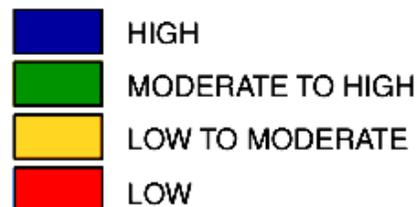
Distribution of Median Discharges



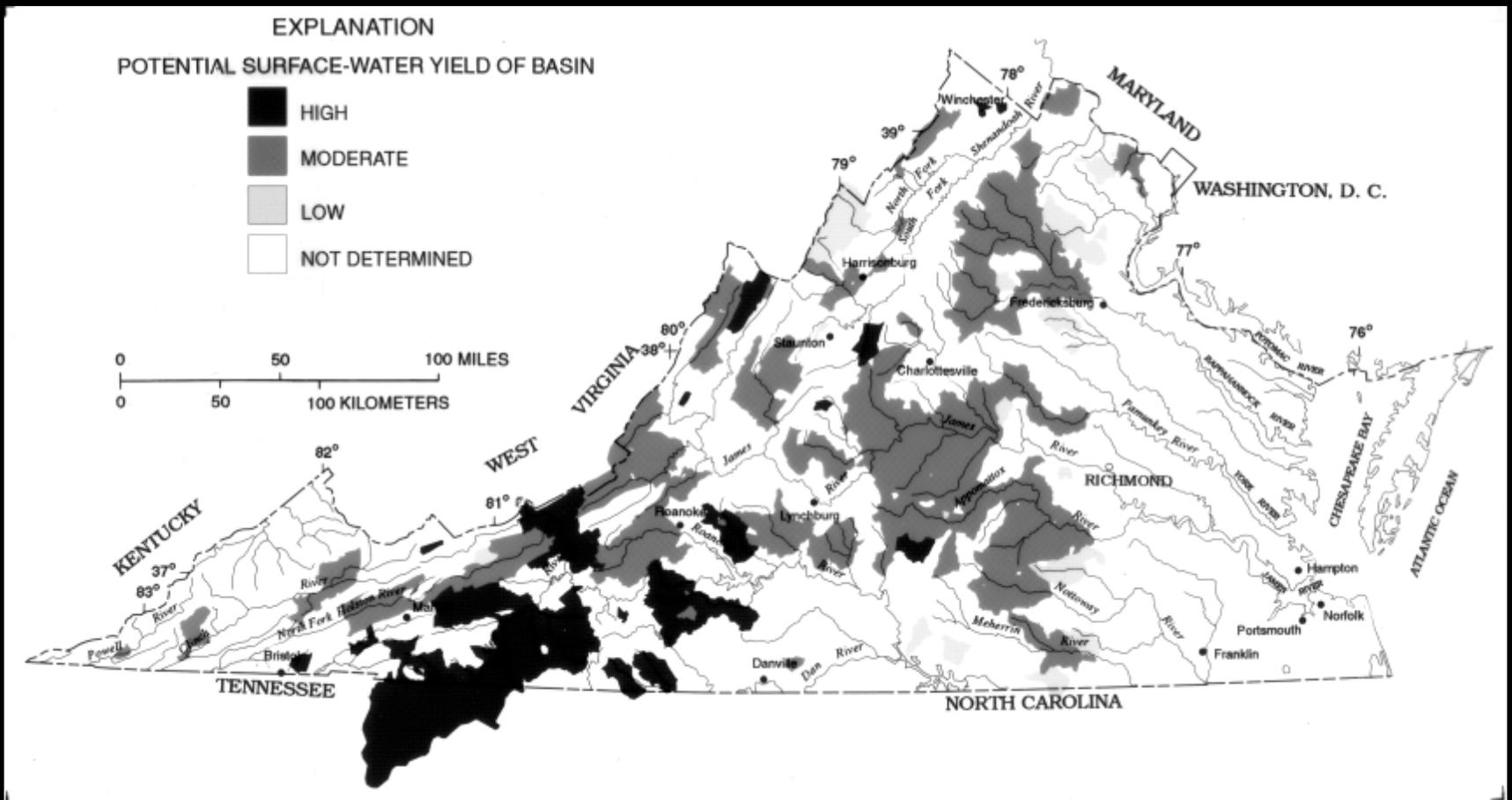
Group Ranking from Tukey's Multiple Comparison Test



EXPLANATION



Spatial Distribution of Potential Surface-Water Yield



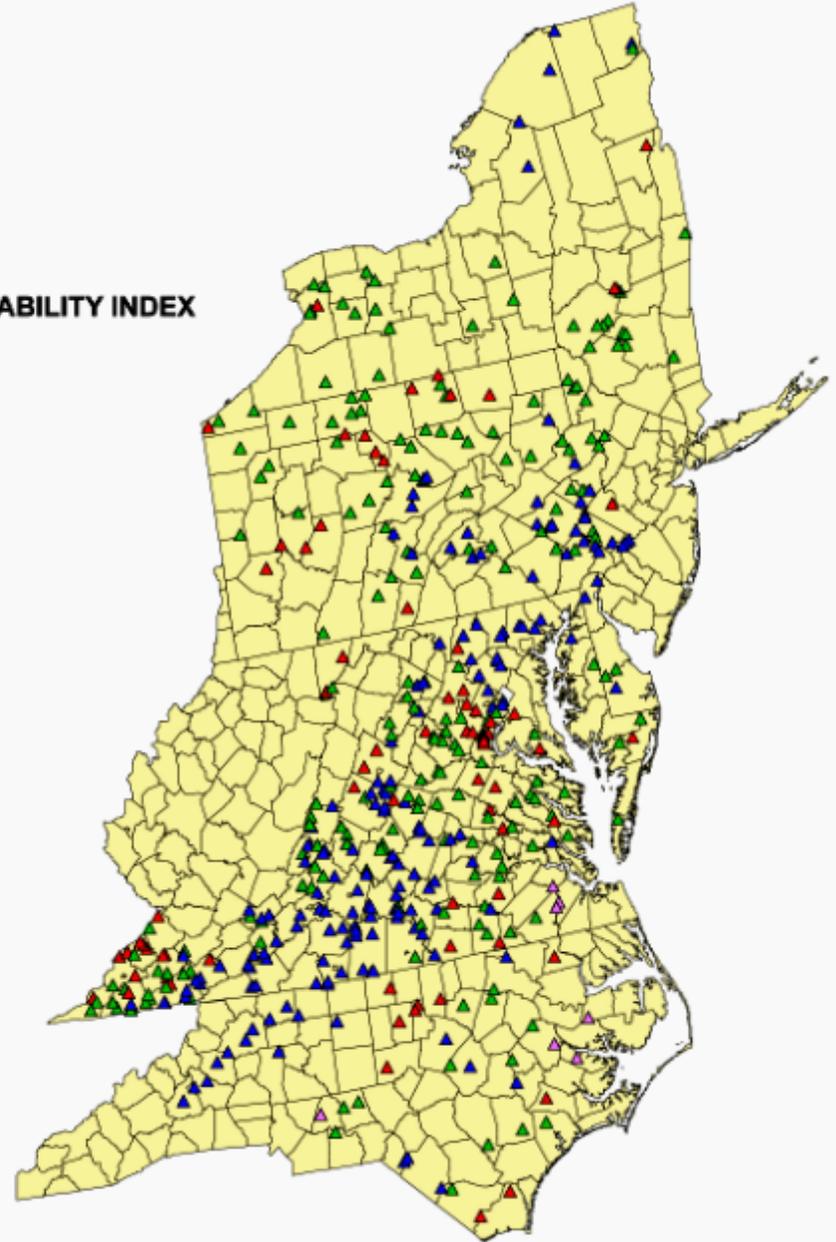
Base-Flow Variability Index

- $\text{BFVI}_{(\text{NH}^2)} = \log (Q50/Q90)$
- Similar to Lane's Variability Index for the lower end of the flow-duration curve.

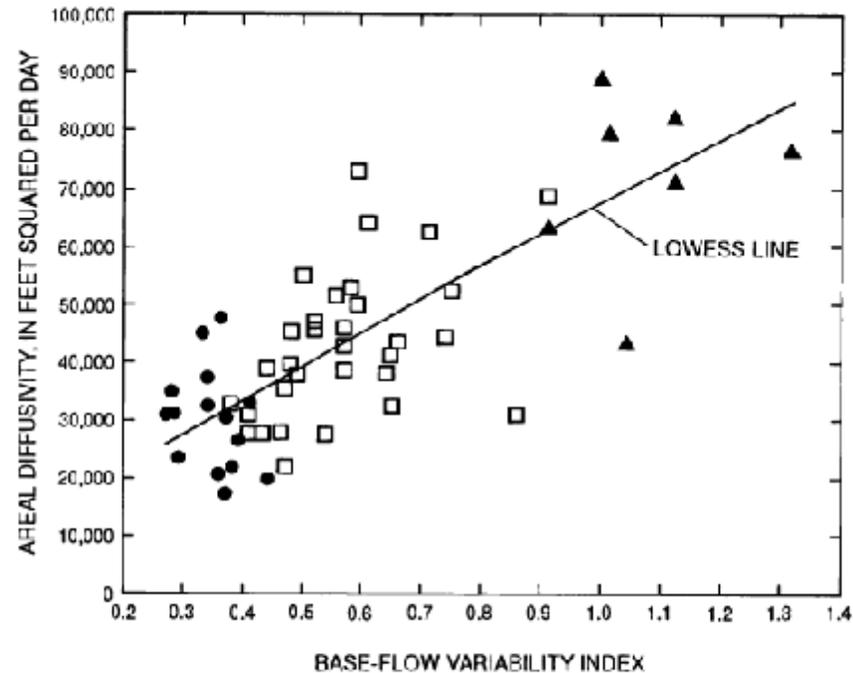
Base-Flow Variability Index for the Mid-Atlantic Region

BASE-FLOW VARIABILITY INDEX

- ▲ 0.16 to 0.53
- ▲ 0.53 to 0.86
- ▲ 0.86 to 1.38
- ▲ 1.38 to 3.00



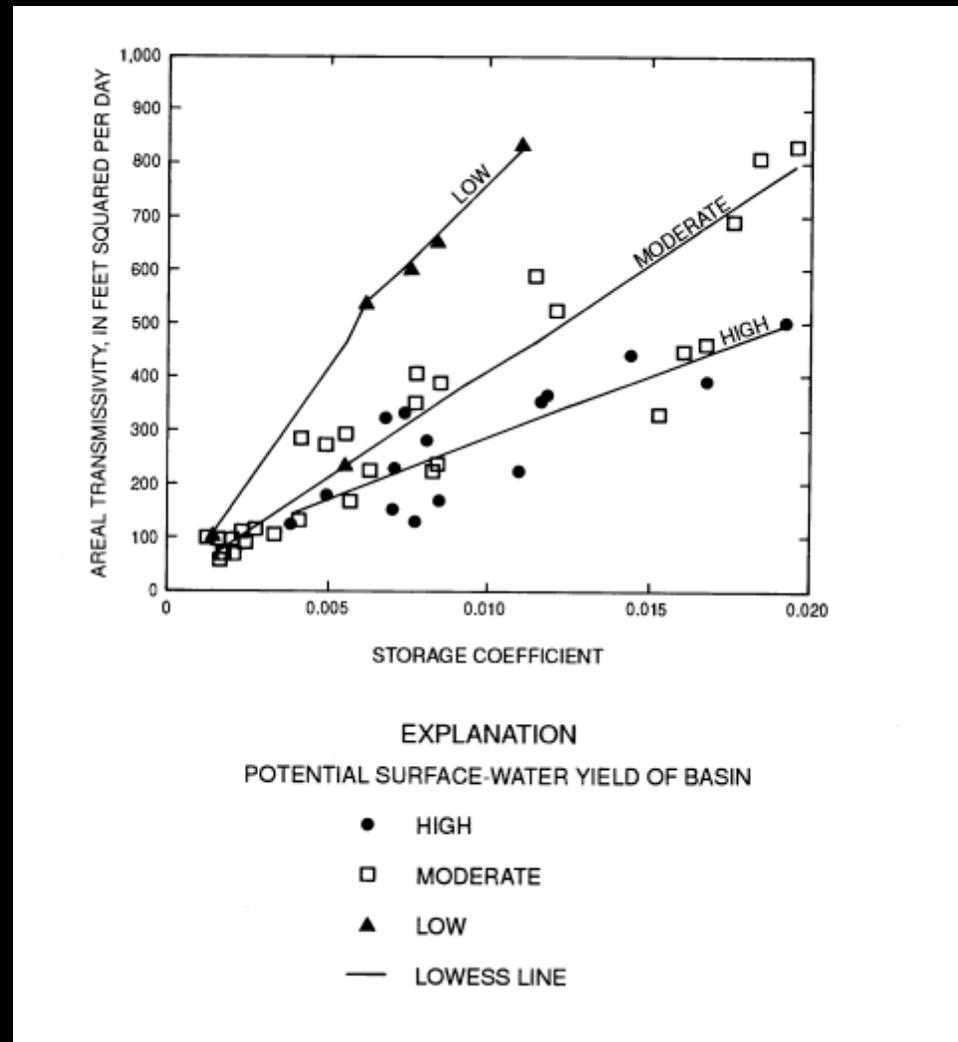
Relation Between Areal Diffusivity and Base-Flow Variability Grouped by Potential Surface-Water Yield



EXPLANATION
POTENTIAL SURFACE-WATER YIELD OF BASIN

- HIGH
- MODERATE
- ▲ LOW

Relation Between Areal Transmissivity and Storage Coefficient Grouped by Potential Surface-Water Yield



Study Conclusions

- Potential ground-water yield is directly related to potential surface-water yield.
- Base-flow characteristics may provide a relative indication of the potential ground-water yield for areas that lack sufficient specific capacity or well-yield data.

